

vision—"the first-born lands of our mother-earth joyously basking in the smiles of the sun, bathed in the tear-drops of the clouds, and scarred with the blasts of the waves and the storms." His composition is founded on the well-based theories of the 'Principles' and 'Siluria;' and the judiciously chosen colours on his canvas have been supplied by the proved researches of modern geologists.

The author's style is florid, but often good; and, though objections may be made to occasional loose or obscure passages, to the too widely printed pages, and to the pompous classification of the woodcuts as "plates" and "lignographs," yet we recommend this little book as well worth the attention of geologists, students, and others: it has numerous woodcut illustrations, some of them of superior execution.

## PROCEEDINGS OF LEARNED SOCIETIES.

### ROYAL SOCIETY.

December 22, 1859.—Sir Benjamin C. Brodie, Bart., President, in the Chair.

"On the Structure of the *Chorda dorsalis* of the Plagiostomes and some other Fishes, and on the relation of its proper Sheath to the Development of the Vertebræ." By Professor Albert Kölliker, of Würzburg.

I take the liberty to present to the Royal Society the results of an extended series of investigations into the development of the vertebræ of the plagiostomous and some other fishes.

#### I. *Chorda dorsalis*.

##### A. Structure.

The chorda dorsalis of the Plagiostomes, of *Chimæra*, *Acipenser*, *Scaphirhynchus*, *Toxodon*, and *Lepidosiren*, shows four distinct parts, viz.—

1st. The *outer elastic membrane*, a homogeneous elastic coat, which is not unfrequently perforated with holes of different sizes, of the same kind as those of the fenestrated membrane of Henle.

2nd. The *proper sheath*, formed of connective tissue of fibrous appearance, and generally provided with many plasm-cells.

3rd. The *inner elastic layer*, a reticulated elastic membrane; and

4th. The *gelatinous substance* of the chorda itself, made up of soft cartilage-cells, of different sizes and generally provided with nuclei.

Of these four layers it would seem that only the third and fourth are present in the higher animals, from the Amphibia (with the exception of the Batrachians) upwards; if, at least, my opinion be correct, that the structureless envelope of the chorda of these animals, generally called the sheath proper, corresponds to the third layer in the cartilaginous fishes. On the other hand, it seems that many of

the osseous fishes present the same complications of structure as the Plagiostomes, if it is true that the bodies of their vertebræ are developed from the proper sheath of the chorda. So, for instance, there exists a beautiful elastic internal layer outside of the remnants of the gelatinous chorda in the genus *Orthogoriscus*.

### B. Form of the chorda proper.

1st. The chorda retains in some instances its original cylindrical form; and this is the case when the vertebral column shows no indication of vertebral bodies (*Cyclostomes*, *Acipenser*, *Chimæra*, *Lepidosiren*, *Tilurus*, *Hyoprurus*\*—anterior vertebra), as well as where vertebral divisions exist (*Leptocephalus*, *Helmichthys*, *Hyoprurus*—last vertebra).

2nd. In other cases the chorda is contracted in the middle region of each vertebral body, which seldom happens where there is no trace of ossification (*Hexanchus*), but is very generally the case in ossified vertebræ (*Squali*, osseous fishes, perennibranchiate amphibia, *Cæcilia*).

3rd. Lastly, the chorda may be separated into as many parts as there are interstices between the vertebræ, which remaining parts in some cases are totally absorbed (*Raia* and most of the higher animals).

### C. Anterior end of the chorda.

1st. In many full-grown fishes the chorda dorsalis reaches with its anterior attenuated end to the base of the cranium, and its cranial part is in some cases enveloped in its whole length by the cranial cartilage. This fact has been long known with regard to the *Acipenseridæ*, *Cyclostomi*, and *Sirenoidei*; but the same thing occurs amongst the *Squali*, and has been observed by Stannius in *Prionodon*, and by me in *Heptanchus*, *Centrophorus*, *Acanthias*, and *Squatina*. In these last fishes the chorda reaches as far as the region of the hypophysis, and is bent upwards at its termination, so that the end itself lies underneath the interior perichondrium of the cranium, or at least very near the surface of the cartilage. In other cases only the hinder part of the chorda is enclosed by the cranial cartilage, whilst the anterior half lies in a groove at the under part of it, as in *Leptocephalus* and *Helmichthys*. In one case (*Tilurus*) the whole cranial part of the chorda is free, and situated underneath the base of the cranium, between its cartilage and the perichondrium †.

2nd. In some genera of *Squali* and most of the osseous fishes, the cranial part of the chorda is reduced to the anterior half of the first ligamentum intervertebrale.

3rd. In the genus *Chimæra*, the chorda ends in the foremost part of the vertebral column. In this case the connexion between the

\* Two genera belonging to the *Leptocephalidæ*, described by me (see Kaup, *Apodal Fishes of the British Museum*. London, 1856).

† In all these fishes there exists rather a strong connexion between the vertebral column and the cranium; in *Squatina*, besides this there are two lateral articulations between the cartilaginous arches of the first vertebra and the lateral parts of the cranial cartilage.

cranium and the column is maintained by an articulation, which on the side of the column is formed by the cartilaginous vertebral arches.

4th. In the Raiidæ, finally, the chorda ends at a greater distance from the skull; and in this case also the anterior part of the column, which is formed only by the coalesced arches, is connected with the cranium by a real articulation.

## II. Ossification and Development of the Bodies of the Vertebræ.

### A. General remarks on the part which the chorda takes in the formation of the vertebræ.

1st. In all cases where the chorda ossifies, it is only its second layer, or the *sheath proper*, which undergoes changes. At the same time the *elastica externa* disappears totally, or is at least dissolved in such a manner that its remnants are scarcely distinguishable, whilst the *elastica interna* and the chorda proper generally remain unaltered. In one case only, viz. in *Scymnus lichia*, ossification is to be seen even in the gelatinous substance of the chorda.

2nd. The ossification of the sheath of the chorda has been observed as yet only in the Plagiostomes and in certain genera of the osseous fishes; but very probably it will be found in all osseous fishes. On the contrary, it is absent in all higher Vertebrata,—according to my observations, even amongst the Batrachia.

### B. Changes of the sheath of the chorda during ossification.

#### 1. Vertebral column.

1st. In the Plagiostomes the sheath of the chorda in the first place assumes a greater hardness in certain parts, these parts being transformed into fibro-cartilage or real cartilage, whilst the intervening parts retain their primitive softness. In this manner the first indications appear of the vertebral bodies and intervertebral ligaments, the interior parts of which are formed by the chorda itself and the *elastica interna*. The histological changes going on during this formation of the vertebral bodies, viz. the transformation of the primitive plasm-cells of the sheath into cartilage-cells, and the development of the homogeneous interstitial substance of the cartilage out of the fibrous substance of the sheath, speak strongly in favour of the view that both kinds of cells and intervening substances are closely allied, whatever may have been the development of the elements of the primitive sheath.

In the *Leptocephali* the sheath of the chorda ossifies without having been transformed into cartilage; and the same seems to hold good for the other osseous fishes.

2nd. Whilst this transformation of certain parts of the sheath of the chorda into cartilaginous vertebral bodies is going on, there are also formed in the interior of each of these bodies peculiar vertical dissepiments. These dissepiments, developed by an interior growth of the sheath of the chorda, whereby the chorda proper becomes constricted, occur in some cases in vertebræ without any or with very



slight traces of ossification, as in *Hexanchus* and the anterior vertebra of *Heptanchus*, whilst they may be almost wanting in others pretty well ossified (*Leptocephalus*, *Helmichthys*, *Centrophorus*).

3rd. The ossification of the cartilaginous vertebral bodies formed out of the sheath of the chorda never begins at the surface, but always in their interior, and also in their middle region, and is (as far as I know, without exception) in the first instance a calcified fibro-cartilage, or what I call a fibrous bone.

4th. The first osseous parts have the form of thin *rings* (*Heptanchus*, anterior vertebra), which afterwards assume that of hollow and thin *double cones* (*Heptanchus*, posterior vertebra, *Centrophorus*).

5th. The growth of these double cones, which are the real osseous vertebral bodies, when once they have assumed their whole length, takes place especially at their *outer side*, through the addition of *calcified cartilage* (chondriform bone, Williamson; *Knorpel-Knochen* in German), which is formed from the outer chordal cartilage of the vertebral body. In addition to this, the osseous double cone thickens also at the expense of the cartilage inside of it, but in a much smaller degree.

6th. In some cases the outer growth is everywhere the same, and in this manner stronger double-coned vertebral bodies of uniform thickness are formed. In other cases the growth is in some parts more active than in others, and vertebral bodies then originate with outer ridges and lamellæ (*Heptanchus*, *Raia*, *Carcharias*, *Mustelus*, *Galeus*). In one single instance the ossification of the outer cartilage takes place in such a way that the exterior parts of the vertebral bodies are formed by alternating circles of chondriform bone and cartilage (*Squatina*).

7th. With regard to the extension of this growth of the vertebral bodies formed by the ossification of the sheath of the chorda, it is to be remarked that in some cases the whole, or nearly the whole sheath of the chorda ossifies, as in *Squatina* and the Raiidæ. In other cases greater or lesser parts of the primitive cartilage, inside and outside the vertebral body, remain in their primitive state (*Squali*).

## 2. Skull.

In some instances even *the sheath of the cranial part of the chorda ossifies* in its hindermost part, and *forms a true vertebral body for the occipital vertebra*, which entirely corresponds to those of the column. This has been observed by me as yet in *Leptocephalus* and several *Squalidæ*; but it is extremely probable that the *basilar occipital* of all osseous fishes, viz. that part of this bone which resembles a common vertebral body, is developed quite in the same way.

### C. On the manner in which the outer ossifying layer is concerned in the formation of the bodies of the vertebrae.

1st. In those cases where the outer ossifying layer, viz. that layer in which the cartilaginous arches are developed, takes part in the formation of the vertebral bodies, there are to be distinguished two

different processes,—one in which the crural cartilages themselves play a part in this formation, and a second, where only the periosteal layer between them is concerned.

2nd. Where the crural cartilages take a part, they form, in the first place, by their coalescence an *outer cartilaginous layer* around the body of the vertebra, which took its origin from the chorda, and which we shall henceforth call *the chordal vertebral body*.

3rd. This outer cartilaginous layer ossifies in many cases; and this ossification may take place in *two* places only, viz. on the right and left side of the vertebral body, as in *Heptanchus*, or in *four* places, in which case a superior point of ossification at the floor of the neural canal, and an inferior one at the roof of the hæmal canal, are added to the two lateral ones (*Acanthias*, *Scymnus*).

4th. These external ossifications of chondriform bone may retain their primitive form of plates, and may then be called the lateral, superior, and inferior osseous plates; or they acquire by additional growth, at the expense of the outer cartilaginous layer, the form of wedge-shaped or cuneiform bodies, and may be named the lateral, superior, and inferior wedges (*Zapfen*, *Keile*, Germ.).

5th. In both cases these external ossifications comport themselves in two different ways with regard to the chordal vertebral body, inasmuch as in some cases both coalesce at their ends (*Scymnus*, *Acanthias*), whilst in others they remain separated (*Heptanchus*).

6th. In some peculiar cases (*Squali*, possessing a nictitating eyelid, viz. *Mustelus*, *Carcharias*, *Galeus*, *Sphyrna*) the cartilaginous arches remain separated, and then the intermediate periosteal layer performs the part of an osteogenic stratum. The osseous parts produced in this way lie at the same places as the bony plates mentioned under 4 and 5; they always possess the form of wedges, and coalesce with the chordal vertebral body, in some cases only at their ends, in others in their whole length. Although these ossifications are not developed from cartilage and have a very peculiar structure (they consist of a calcified fibro-cartilage with peculiar ossified strong fibres running straight through their whole thickness), it is clear enough that they exactly correspond to the above-mentioned plates and wedges of other Plagiostomes formed out of the coalesced crural cartilages.

From certain modes of transformation of the sheath of the chorda, combined with certain changes of the outer ossifying layer, the following types in the composition of the vertebral bodies may be established.

TYPE I.—*The vertebral body takes its origin entirely from the proper sheath of the chorda.*

A. *Sheath of the chorda thick.*

1st. Vertebral bodies soft (fibro-cartilaginous), incompletely separated from each other, and only distinguished by the interior septa of the chorda. *Hexanchus*.

2nd. Vertebral bodies partly cartilaginous, with annular ossifica-

tions of the form of short double cones. Ligamenta intervertebralia very strong. *Heptanchus* (anterior vertebra).

3rd. Vertebral bodies wholly cartilaginous, with thin osseous double cones of good length in the middle of the cartilaginous body. *Centrophorus*.

4th. Vertebral bodies well ossified, cylindrical and strong, formed inside by strong osseous double cones, and outside by alternating layers of cartilage and bone. *Squatina*.

#### B. Sheath of the chorda thin.

5th. Vertebral body a thin hollow osseous cylinder; chorda proper in its whole length cylindrical. *Leptocephalus*, *Helmichthys*, *Hyoprorus* (last vertebra).

6th. Vertebral bodies slightly constricted osseous double cones, with external longitudinal ridges. *Chauliodus*, *Stomias*.

TYPE II.—*The vertebral body is formed partly from the sheath of the chorda and partly from the outer ossifying layer.*

1st. Chordal vertebral body partly cartilaginous, with a stronger osseous double cone in its middle part. External part of the body formed by a thin layer of cartilage from the coalesced arches, with two lateral ossified plates. *Heptanchus* (posterior vertebræ).

2nd. The same with four external ossifications, whose ends coalesce with the internal double cone. *Acanthias*, *Scymnus*.

3rd. Chordal vertebral body nearly totally ossified, of the form of a strong double cone, with strong external longitudinal ridges. External part of the body a strong layer of cartilage with superficial ossifications continuous with those of the arches. *Raia*, *Torpedo*.

4th. Chordal vertebral body nearly wholly ossified, of the form of a thick double cone. External part of the body formed by cartilage, with four strong wedge-shaped ossifications uniting with the ends of the inner double cone. *Scyllium*.

5th. Chordal vertebral body a strong osseous double cone, partly with external ridges. External part of the body formed by four strong wedge-shaped ossifications, derived from the periosteal layer between the cartilaginous arches, which in some genera totally coalesce with the inner double cone, whilst in others this happens only at the ends of the latter. *Mustelus*, *Carcharias*, *Sphyrna*, *Galeus*.

TYPE III.—*The vertebral bodies are wholly developed from the external ossifying layer.*

1st. The vertebral bodies are developed from four cartilaginous parts, viz. the superior and inferior arches. Anterior vertebræ of the Raiidæ.

2nd. The vertebral bodies are developed only from two cartilaginous or osseous parts.

a. From the two neural arches, which in uniting do not enclose the chorda, which lies underneath them. *Cultripes provincialis*, J. Müller, *Rana paradoxa*, Dugès.



- b. From two lateral plates of ossified connective tissue, which in uniting totally enclose the chorda. Acaudate Batrachia, according to my own observations.
- c. From two lateral cartilages which enclose the chorda, and also develop the arches from themselves. Higher Vertebrata.

In terminating this Note, I take the liberty of adding that the only information heretofore existing on the subject to which it refers, is that contained in the very valuable memoirs by J. Müller\* and Williamson†.

## ZOOLOGICAL SOCIETY.

March 8, 1859.—John Gould Esq., F.R.S., V.P., in the Chair.

DESCRIPTION OF A NEW SPECIES OF ELANUS. By J. GOULD, F.R.S.

This new species is one of the largest members of the genus, and is rendered conspicuous by the entire under surface being white, even the basal half of all the primaries being of this hue,—in which respect, and in its larger size, it materially differs from the *E. melanopterus*, the only bird with which it could be confounded.

ELANUS HYPOLEUCUS, Gould.

*Adult*.—Face, space over the eye, ear-coverts, all the under surface of the body, under tail-coverts, under surface of the tail feathers, and the thighs, pure white; the under surface of the wing is also pure white; basal half of the under side of the first six primaries white, slightly speckled with grey, passing into blackish grey; on their apical halves this grey hue also pervades the under surface of the remaining primaries; crown of the head, back of the neck, back, and scapularies, deep grey; on the shoulders a large patch of black; secondaries and basal half of the primaries deep grey, passing into blackish grey at their tips; two centre tail feathers grey above, the next on each side grey on their outer margins, the rest white; cere and legs orange yellow; bill and nails black.

Total length, 14 inches; bill,  $1\frac{1}{4}$ ; wing,  $12\frac{1}{8}$ ; tail,  $6\frac{3}{4}$ ; tarsi,  $1\frac{5}{8}$ .

*Young*.—At apparently about nine months old differs from the adult in having the crown lined with reddish brown, and a crescent of white at the tip of the primaries, secondaries, scapularies, and wing-coverts.

*Hab*. Vicinity of Macassar, Celebes.

*Remark*.—The above description of the adult is taken from a fine example in the possession of J. H. Gurney, Esq., which, as well as the young bird in the possession of Mr. Gould, was collected by Mr. Wallace.

April 12, 1859.—Professor Busk, F.R.S., in the Chair.

DESCRIPTION OF A RARE ENTOZOOON FROM THE STOMACH OF THE DUGONG. BY W. BAIRD, M.D., F.L.S., &c.

In the Museum of the College of Surgeons there is a preparation of an *Ascaris* from the stomach of the Dugong. In dissecting this

\* Vergleichende Anatomie der Myxinoiden.

† Phil. Trans. 1850.

animal, Professor Owen discovered several specimens of an intestinal worm, which he named *Ascaris halichoris*. The preparation was made in 1831, and the 'Catalogue of the Physiological Series of Comparative Anatomy' was published by the College in 1833. About the same period, but in a different part of the world, Rüppell found the same species of worm in the stomach of the same species of animal. He very briefly notices them in describing a Dugong which he found in the Red Sea, but merely mentions that these Entozoa "were found in a clustered glandular apparatus in the stomach, and were 5 inches long." His description of this Dugong was sent in a letter to Dr. Sömmering, and is dated from the Island of Dahalac on the Abyssinian coast of the Red Sea, in the month of January, 1832. This paper was published in the first volume of the 'Museum Senckenbergianum,' in 1834. In the 'Proceedings of the Zoological Society' in 1838, there is an elaborate paper by Professor Owen, descriptive of the principal viscera of the Dugong; and in this paper he again notices these worms, and there mentions that they were originally found in a remarkable glandular apparatus situated near the cardiac extremity of the stomach. In the article *Entozoa* in Todd's 'Cyclopædia of Anatomy and Physiology,' the Professor again alludes to them in reference to its peculiar digestive apparatus, showing the presence of a cæcum, which arises from the upper portion of the intestine. This organ he considers a kind of accessory to the digestive apparatus, and of rather a peculiar nature. "The second example," he says, "of an accessory digestive gland occurs in a species of *Ascaris* infesting the stomach of a Dugong: here a single elongated cæcum is developed from the intestine at the distance of half an inch from the mouth; and is continued upwards, lying by the side of the beginning of the intestine, with its blind extremity close to the mouth; from the position where the secretion of this cæcum enters the intestine, it may be regarded as representing a rudimental liver." The next mention we find of this worm is in the 'Mémoires de l'Académie Impériale de St. Pétersbourg.' In the 7th volume of the Mémoires (the 5th volume of the 'Sciences Naturelles'), Brandt has published a paper entitled 'Symbolæ Sirenologicæ,' illustrating the natural history of the *Rhytina borealis* or *Stelleri*, a specimen of a Cetacean allied to the Dugong, in which he mentions the fact that Steller had found a number of white worms in a gland attached to the stomach of that animal; and in a note to his paper he says, "they are similar to those found by Owen and Rüppell in the Dugong." Lastly, Diesing, in his valuable work, 'Systema Helminthium,' 1851, apparently not aware of Professor Owen having named this *Ascaris*, enumerates it, along with a number of others, amongst his list of doubtful species, or "Species inquirendæ," under the name of *Ascaris dugonis*—a name which of course cannot stand, as that of Professor Owen has the precedence of nearly twenty years. The species found in the *Rhytina* by Steller appears to have been six inches long, the same length as those observed by Rüppell in the Dugong; but as this latter animal was found in the Red Sea, whilst



the former was taken in Behring's Straits, they can scarcely be identical. The *Ascaris halichoris*, though named long ago, has never been fully described; I now propose to fill up this blank.

ASCARIS HALICHORIS, Owen.

*Caput nudum, epidermide stricte adnata; os labiis rotundatis, porrectis; corpus, in utroque sexu, extremitatibus magis attenuatis; extremitate caudali brevi, subulata, nuda.*

Long. feminæ,  $3\frac{1}{4}$  unc.; maris,  $2\frac{1}{4}$  unc.

The body is of a whitish colour, thickest in the centre, gradually tapering to each extremity, and is strongly striated across; in the female, apparently all its length; in the male, till nearly about half an inch from its posterior extremity. This latter portion is smooth or slightly striated lengthways. In the female, the vagina is situated at about two-thirds of its length from the anterior extremity. The spicula of the male appear very short. The intestine, as described by Professor Owen, has a cæcum developed from it at the distance of about half an inch from the mouth, and is continued upwards, lying by its side, and terminating in a blind extremity near the mouth. The specimens, now in the British Museum, are shorter than those noticed by Rüppell.

May 10, 1859.—John Gould, Esq., V.P., in the Chair.

DESCRIPTION OF A NEW SPECIES OF DIVER (COLYMBUS).

BY GEORGE ROBERT GRAY, ESQ., F.L.S., ETC.

COLYMBUS ADAMSII, G. R. Gr.

Closely allied to *C. glacialis*; but the head and collar round the neck shining bluish-black, except on the top of the head and neck, which have a slight green reflexion; the rows of spots of the tertiaries and secondaries very much larger and more like those of *C. arcticus*, while the spots on the sides of the abdomen and upper tail-coverts are smaller than those of *C. glacialis*. This bird is easily distinguished from either of those species by its larger bill, by having the gonys more strongly developed, and by its bill being of a yellowish-white colour.

Length 31"; bill from gape 5", from the base of culmen 3" 9"; wings 15".

*Hab.* Russian America.

This fine species is named after the late Mr. Adams, Surgeon of H.M.S. Enterprise, commanded by Capt. Collinson, in the voyage made by him through Behring's Straits. Mr. Adams employed his pencil in producing beautiful drawings of the remarkable birds obtained during the voyage; but after his return to this country, he undertook the appointment of surgeon to one of H. M. S. on the West African Station, where he soon fell a victim to the unhealthy climate.

ON SOME NEW SPECIES OF SYNALLAXIS. BY PHILIP LUTLEY SCLATER, M.A., F.L.S., SECRETARY TO THE SOCIETY.

1. SYNALLAXIS PUDICA.

*Murino-brunnea, alarum remigibus et cauda obscurioribus; pileo cum fronte et alarum tectricibus omnibus rufis: subtus cinerascens, ventre imo albicantiore, lateribus brunnescentibus: rostro superiore nigricante, inferiore plumbeo; pedibus validis, nigris; cauda elongata, reatricibus decem.*

Long. tota 7·0, alæ 2·6, caudæ 4·0, tarsi 0·95.

*Hab.* In Nov. Granada int.

This species is allied to *Synallaxis fuliginosa*, and of the same form, but easily distinguishable by its red head. From *S. elegans* (also from New Granada) it differs in its earthy-brown tail and cinereous colour below. The single specimen in the British Museum is a "Bogota" skin. I have likewise an example in my own collection, received from MM. Verreaux of Paris.

2. SYNALLAXIS STICTOTHORAX.

*Murino-brunnea, uropygio rufescente; alis caudaque intus nigricanti-brunneis, extus rufo late limbatis; superciliis a fronte et lateribus cervicis albidis, nigro obsolete punctatis: subtus alba, lateribus et ventre imo rufescentibus; pectore toto maculis triangularibus nigricantibus asperso: rostro nigro, basi alba, pedibus fuscis.*

Long. tota 4·75, alæ 2·0, caudæ 2·25, tarsi 0·75.

*Hab.* In rep. Equator.

I first noticed a specimen of this *Synallaxis* in Sir William Jardine's collection. The British Museum contains an example transmitted from Guayaquil by Mr. Barclay. The species is not very like any other *Synallaxis* that I am acquainted with, and may be distinguished easily by the arrow-headed or triangular spots on the breast, which are partly continued up the sides of the neck, and of which there are also some faint indications on the superciliaries.

3. SYNALLAXIS SCUTATA.

*Supra murino-brunnea; dorso toto, alis extus et cauda rufis; superciliis ante oculum albis, post oculum magis cinnamomeis; remigum parte interna nigricante: subtus alba, pectore cinnamomeo lavato, plaga distincta quadrilaterali in cervice antica nigra: rostro plumbeo, basi pallidior; pedibus pallide brunneis.*

Long. tota 5·75, alæ 2·25, caudæ 2·75, tarsi 0·8.

*Hab.* In Brasilia.

I have as yet only seen one specimen of this distinct species, which is in the British Museum.

May 24, 1859.—G. R. Waterhouse, Esq., V.P., in the Chair.

ON THE DEVELOPMENT OF AURELIA AURITA IN THE SOCIETY'S AQUARIA. BY E. W. H. HOLDSWORTH, F.L.S.

Few persons can have paid any attention to marine aquaria without noticing in them the frequent occurrence of the little white

polype, commonly known as *Hydra tuba*. The ova producing them are doubtless introduced with the sea-water; and if the conditions are suitable for their development, the rock-work and sides of the tank are often studded with hundreds of their delicate transparent bells. The changes they undergo before assuming the adult form have been investigated by Sars, Siebold, and many other naturalists; and it is now well known that these little polypoid forms are only early states of *Aurelia aurita*—the medusa seen thronging our coasts in such countless thousands during the summer months. The perfect animal, however, is so rarely produced within the limits of an aquarium, that a recent case of its occurrence in one of the Society's tanks appears to me worthy of record. Since the establishment of the Fish-house in the Zoological Gardens, not a year has passed without the abundant production of the polypes in several of the tanks, and their transverse splitting and change to medusoids have been frequently observed; but no further development has taken place, and after a short period the young animals have gradually disappeared. In the present year, however, greater success has been attained; and this is perhaps partly due to the water in the tank having been kept at a nearly uniform temperature, from the absence of any severe cold during the early part of the season. The polypes made their usual appearance about the end of January; and after two or three weeks a considerable number of medusoids were detached, of which a few only have survived; but some of these now exhibit all the specific characters of the perfect Medusa, the largest specimen at the present time being 3 inches in breadth when dilated, and the others of various intermediate sizes. It is unnecessary to detail here the gradual changes undergone in the course of development to the perfect animal, as they have been fully and accurately described by several authors: I will only mention that an instance was observed of two medusoids having been thrown off together from the parent stock, and remaining united for more than a week: each gave evidence of independent existence; and their course through the water was marked by great irregularity, from the uncertain and sometimes opposite action of the two disks.

The water containing these Medusæ has remained for several months unchanged; but its purity has not been endangered by the presence of fish, or other animals requiring a large supply of oxygen.

#### INDICATIONS OF THE EXISTENCE OF A SECOND SPECIES OF EMEÜ (DROMÆUS). BY A. D. BARTLETT.

The specimen of *Dromæus* now exhibited was obtained with others far in the interior of South Australia, several hundred miles from Port Philip.

It differs from *Dromæus Novæ-hollandiæ* in having the whole of the feathers of the body distinctly marked with narrow transverse bars of light grey and dark brownish black. The feathers of the back and sides of the bird are broader and longer and less silky in texture than those of the common species: that this is so, is quite evident to the touch. The upper part of the neck and head is nearly black;



and the feathers appear thicker than those on these parts in the common bird.

The specimen from which these remarks are taken was one of three examined by me, two of which were adult, and one a young bird about one-third grown. This young bird exhibited the transverse bars on its plumage as distinctly as the adult bird; at the same time the broad longitudinal stripes were clearly to be seen. Judging from the skins, I am inclined to consider this bird to be smaller than the common species. As I hope before long to obtain more information respecting these birds, together with other and more perfect specimens, I beg to propose provisionally the name of *Dromæus irroratus* for this supposed new species.

A RECORD OF THE NUMBER OF DAYS OF INCUBATION OF BIRDS WHICH BREED IN THE SOCIETY'S GARDENS. BY PHILIP LUTLEY SCLATER, M.A., F.L.S.

The subjoined table, furnished to me from the observations of our intelligent Assistant Head Keeper, Benjamin Misselbrook, gives the period of incubation of eighteen species of birds which ordinarily breed in our Gardens. The time of incubation appears to be as constant in each species of bird as the period of gestation in each species of mammal; and I think that every addition to our imperfect knowledge of this subject must be of interest to the naturalist, and worthy of record.

	Days.
1. Emeu * ( <i>Dromæus Novæ-hollandiæ</i> ).....	56
2. American Rhea ( <i>Rhea americana</i> ) .....	35
3. Impeyan Pheasant ( <i>Lophophorus Impeyanus</i> )....	28
4. Cheer Pheasant ( <i>Catreus Wallichii</i> ).....	28
5. Purple Pheasant ( <i>Gallophasis Horsfieldii</i> ) .....	24
6. White-crested Kaleege ( <i>Gallophasis albocristatus</i> )	26
7. Black-backed Kaleege ( <i>Gallophasis melanonotus</i> ) .	24
8. Californian Quail ( <i>Callipepla californica</i> ).....	21
9. Crowned Pigeon ( <i>Goura coronata</i> ) .....	28
10. Crested Pigeon ( <i>Ocyphaps lophotes</i> ).....	14
11. Black-necked Swan ( <i>Cygnus nigricollis</i> ) .....	35
12. Black Swan ( <i>Cygnus atratus</i> ) .....	35
13. Cereopsis Goose ( <i>Cereopsis Novæ-hollandiæ</i> ) ...	35
14. Sandwich-Island Goose ( <i>Bernicla sandvicensis</i> ) ..	31
15. Ashy-headed Goose ( <i>Chloëphaga poliocephala</i> ) ..	30
16. Ruddy Shieldrake ( <i>Casarca rutila</i> ) .....	30
17. Summer Duck ( <i>Aix sponsa</i> ).....	30
18. Mandarin Duck ( <i>Aix galericulata</i> ) .....	30

June 28, 1859.—Dr. Gray, F.R.S., V.P., in the Chair.

DESCRIPTION OF SOME NEW RECENT ENTOMOSTRACA. BY W. BAIRD, M.D., F.L.S., ETC.

The *Entomotraca* now about to be described were taken from some freshwater pools at Nagpur, and placed in my hands by the

\* The eggs of the Emeu and Rhea were hatched in the Society's incubator.

Rev. Mr. Hislop. It is interesting to find two species of *Cypris* in a recent state, that had been already described as fossil.

#### ESTHERIA HISLOPI, Baird.

*Animal*.—Head large, prolonged anteriorly into a beak of considerable size, which is rounded at the extremity, and toothed on its upper edge. The first three or four teeth are very distinct, they then become smaller and less distinct; they are very numerous. Eye large, compound. Superior antennæ or rami thick, rather short, composed of two branches, each of which consists of seven articulations only; each articulation, close to the joint, is armed with short spines, and the last two or three possess longer setæ. Antennules long, nearly half the length of superior antennæ, rather slender, composed of four joints, the last joint rather club-shaped; all destitute of setæ. Tail large, armed with seven or eight pairs of strong, slightly curved hooks; the first pair are long, serrated on the edges; the second pair, near the root, armed with about ten rather stout spines. Mandibles strong, fleshy.

*Shell*.—Carapace nearly orbicular; umbo prominent; margins quite round. Altogether the shell very closely resembles that of the genus *Artemis* or *Dosinia* amongst the Mollusca. Shell surrounded with six or seven concentric ridges; the surface between them, when magnified, is seen to be pitted or marked with very numerous, small, close-set dots or punctures. When dry, it is of a clear, polished, shining appearance.

*Hab*. Freshwater pools at Nagpur (*Rev. S. Hislop*). *Mus. Brit.*

#### CYPRIS SUBGLOBOSA, Sow.

The shell is of a green colour; and the surface is strongly punctured, the pattern resembling the depressed punctures of a thimble. The anterior extremity is somewhat broader than the posterior, and when seen from the inside appears as it were double, the external edge of the carapace being produced beyond the true margin of the shell. The lateral portion of the carapace is very prominently swollen or gibbous. The dorsal margin is convex; the ventral is concave and sinuated.

*Hab*. Freshwater pools at Nagpur (*Rev. S. Hislop*). *Mus. Brit.*

This species appears to be identical with *C. subglobosa* of Sowerby, which was found by my old friend the late John Grant Malcolmson, Esq., in the district of the Sichel Hills, the geology of which he has described at length in the fifth volume of the Transactions of the Geological Society, 2nd series. It was described shortly by Mr. J. de C. Sowerby at the end of Malcolmson's paper, in these words:—"Subglobose, triangular, inflated; front concave; outer surface is punctured." It was found in grey chert, with a species of *Unio* (*U. deccanensis*), &c., and in indurated clay with *Gyrgonites*, *Paludina*, *Physæ*, and *Lymnæi*.

#### CYPRIS CYLINDRICA, Sow.

The shell is of a green colour, somewhat mottled. It is cylindrical in shape; the anterior margin rounded; dorsal margin slightly con-

vex till it approaches the posterior extremity, when it suddenly slopes down, and is there bluntly pointed. The ventral margin is slightly sinuated in the centre. The valves are somewhat gibbous in their lateral portion. Internally, we see near the anterior margin a kind of shelf, which extends across that portion of the shell, and is hollow underneath it—exactly resembling the shelf we see in the shells of the genus *Crepidula*. The surface of the carapace is very minutely and slightly punctate. The edge of the ventral margin of the carapace, both inside and outside, appears thickened, which thickening, as seen on the inside of the shell, extends to the commencement of the dorsal margin at either extremity, and there the shell both internally and externally is strongly and regularly ridged.

*Hab.* Along with *C. subglobosa* in pools at Nagpur. *Mus. Brit.*

This species appears to me to be identical with *C. cylindrica*, described by Mr. Sowerby at the end of Mr. Malcolmson's paper "on the Geology of the Sichel Hills," mentioned above. It was found along with *C. subglobosa* in chert and indurated clay, along with *Unio deccanensis*, *Gyrgonites*, *Paludinæ*, *Physæ*, and *Lymnæi*. The chief difference consists in the recent shells being so slightly punctured on the surface as to appear nearly quite smooth. Mr. Sowerby thus describes it:—"Twice as wide as long, almost cylindrical; front very slightly concave; the outer surface, which is very rarely obtained, is punctured."

CYPRIS CYLINDRICA, Sow., var. MAJOR, Baird.

The chief difference in this variety consists in its larger size, being about double in all its dimensions. The typical or smaller variety described above might at first sight appear to be merely the young; but an examination of a large series of that species shows them to be completely adult shells. The internal shelf, the thickening of the edges of the ventral margin, and the ridges on that margin are all indicative of a full-grown and adult shell.

The colour of the shell of this variety is almost exactly the same as the typical variety; the form is the same, but the shelf is rather larger, and there is some slight indication of a shelf at the posterior extremity also.

*Hab.* Along with the preceding (*Rev. S. Hislop*). *Mus. Brit.*

CYPRIS DENTATO-MARGINATA, Baird.

Shell rounded-oval, swollen, smooth, of a light greenish colour, with a polished shining surface. Anterior extremity slightly narrower than posterior; dorsal margin somewhat convex; ventral margin nearly straight or slightly sinuated. Seen from the inside, the shell near each extremity is toothed, or marked with a series of small projections, like the teeth of a saw.

*Hab.* Pools at Nagpur (*Rev. S. Hislop*). *Mus. Brit.*

[P.S. Since the above was written, I have had my attention called by Mr. Hislop, through my friend Mr. T. Rupert Jones, to a paper by Mr. H. J. Carter, in the 'Geological Papers on Western India, 1857,' in which the author mentions some of the recent *Entomotraca* found in the freshwater deposits of Bombay, and of which he



gives an outline sketch in the Atlas accompanying the volume. These Mr. Carter considers as "the corresponding forms" of the fossil species mentioned by Mr. Malcolmson and described by Mr. Sowerby; but he does not attach any name to them.

In plate 9 of that Atlas, the species figured No. 19 is, without doubt, the same as what I consider to be the *Cypris cylindrica*, var. *major*, of this paper; and the species figured No. 18 is evidently identical with the *Cypris subglobosa*. The third species, figured No. 20, differs from any of those collected by Mr. Hislop.—W. B.]

ON SOME NEW FRESHWATER SHELLS FROM CENTRAL AFRICA.  
BY S. P. WOODWARD, F.G.S.

The four shells which form the subject of the present note were collected by Captain Speke in the great freshwater Lake Tanganyika in Central Africa.

The large bivalve belongs to the genus *Iridina*, Lamarck,—a group of river-mussels, of which there are nine reputed species, all belonging to the African Continent. This little group has been divided into several subgenera. That to which the new shell belongs is distinguished by its broad and deeply-wrinkled hinge-line, and is called *Pleiodon* by Conrad. The posterior slope of this shell is encrusted with tufa, as if there were limestone rocks in the vicinity of its habitat.

The small bivalve is a normal *Unio*, with finely sculptured valves.

The smaller univalve is concave beneath, and so much resembles a *Nerita* or *Calyptraea* that it would be taken for a sea-shell if its history were not well authenticated. It agrees essentially with *Lithoglyphus*,—a genus peculiar to the Danube, for the American shells referred to it are probably, or, I may say, certainly distinct. It agrees with the Danubian shells in the extreme obliquity of the aperture, and differs in the width of the umbilicus, which in the European species is nearly concealed by the callous columellar lip.

In the Upper Eocene Tertiaries of the Isle of Wight there are several estuary shells, forming the genus *Globulus*, Sow., whose affinities are uncertain, but which resemble *Lithoglyphus*.

Lake Tanganyika (situated in lat. 3° to 8° S. and long. 30° E.), which is several hundred miles in length and 30 to 40 in breadth, seems entirely disconnected with the region of the Danube; but the separation may not always have been so complete, for there is another great lake, Nyanza, to the northward of Tanganyika, which is believed by Speke to be the principal source of the Nile.

The other univalve is a *Melania*, of the subgenus *Melanella* (Swainson), similar in shape to *M. Hollandi* of S. Europe, and similar to several Eocene species of the Isle of Wight. Its colour, solidity, and tuberculated ribs give it much the appearance of a small marine whelk (*Nassa*); and it is found in more boisterous waters, on the shores of this great Inland Sea, than most of its congeners inhabit.

1. IRIDINA (PLEIODON) SPEKII.

Shell oblong, ventricose, somewhat attenuated at each end; base slightly concave; epidermis chestnut-brown, deepening to black at

the margin; anterior slope obscurely radiated; hinge-line compressed in front and tuberculated, wider behind and deeply wrinkled.

Length  $4\frac{3}{4}$ , breadth 2, thickness  $1\frac{3}{4}$  inches.

## 2. UNIO BURTONI.

Shell small, oval, rather thin, somewhat pointed behind; umbones small, not eroded; pale olive, concentrically furrowed, and sculptured more or less with fine divaricating lines; anterior siphon narrow, not prominent; posterior teeth laminar; pedal siphon prominent with anterior adductor.

Length 12, breadth  $8\frac{1}{2}$ , thickness  $5\frac{1}{2}$  lines.

## 3. LITHOGLYPHUS ZONATUS.

Shell orbicular, hemispherical; spire very small; aperture large, very oblique; umbilicus wide and shallow, with an open fissure in the young shell; lip continuous in front with the umbilical ridge; columella callous, ultimately covering the fissure; body-whirl flattened, pale olivaceous, with two brown bands, darker at the apex; lines of growth crossed by numerous oblique, interrupted striae.

Diameter 5-6, height 3 lines.

## 4. MELANIA (MELANELLA) NASSA.

Shell ovate, strong, pale brown, with (sometimes) two dark bands; spire shorter than the aperture; whirls flattened, ornamented with six brown spiral ridges crossed by a variable number of white, tuberculated, transverse ribs; base of body-whirl with eight tuberculated spiral ridges variegated with white and brown; aperture sinuated in front; outer lip simple; inner lip callous.

Length  $8\frac{1}{2}$ , breadth  $5\frac{1}{2}$  lines.

P.S. July 27th.—In addition to the foregoing shells, several others were collected by Capt. Speke, when employed, under the command of Capt. Burton, in exploring Central Africa in the years 1856-9; these were deposited in the first instance with the Geographical Society, and are now transferred to the British Museum.

A specimen of *Ampullaria (Lanistes) sinistrorsa*, Lea, and odd valves of two species of *Unio*, both smooth and olive-coloured, were picked up in the Ugogo district, an elevated plateau in lat.  $6^{\circ}$  to  $7^{\circ}$  S., long.  $34^{\circ}$  to  $35^{\circ}$  E.

A large *Achatina*, most nearly related to *A. glutinosa*, Pfr., is the "common snail" of the region between Lake Tanganyika and the East coast. Fossil specimens were obtained in the Usagara district, at a place called Maroro, 3000 feet above the sea, overlooking the Lufji River, where it intersects the coast range (lat.  $7^{\circ}$  to  $8^{\circ}$  S., long.  $36^{\circ}$  to  $37^{\circ}$  E.).

Another common land snail of the same district is the well-known "*Bulimus Caillaudi*, Pfr.," a shell more nearly related to *Achatina* than *Bulimus*.

Captain Speke also found a solitary example of *Bulimus ovoideus*, Brug., in a musjid on the island of Kiloa (lat.  $9^{\circ}$  S., long.  $39^{\circ}$  to  $40^{\circ}$  E.). This species is identical with *B. grandis*, Desh., from the island of Nosse Bé, Madagascar, and very closely allied to *B. libe-rianus*, Lea, from Guinea.